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## EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS ON THE UWHARRIE NATIONAL FOREST, NORTH CAROLINA

By

P. J. Barry and W. E. McDowell

### INTRODUCTION

Aerial sketchmap and ground evaluations were conducted on the Uwharrie National Forest on July 24 and 30, 1975 (Figure 1). The survey was performed so that the current status and trend of the southern pine beetle population on the Forest could be determined. This survey, covering 220,069 acres within the purchase boundary of the Forest, showed that there were 61 individual spot infestations affecting some 2,229 trees.

This southern pine beetle population is part of a South-wide outbreak involving 11 states. The current outbreak on the Forest began in the summer and fall of 1972 and continued at various levels of infestation until this time.

### METHODS

Standard aerial sketchmap procedures were used in this evaluation.<sup>1/</sup> Data from the 50 percent aerial sketchmap surveys were expanded to represent 100 percent coverage and corrected for observer error. Eight spots containing 332 red and fading trees were examined to determine the cause of mortality, number of beetle-killed trees, number of currently infested trees, and condition of the brood.

### TECHNICAL INFORMATION

Insect - Southern pine beetle, *Dendroctonus frontalis*, Zimm.

Hosts - The southern pine beetle will attack all species of southern yellow pine. However, loblolly pine, *Pinus taeda* L., and shortleaf pine, *P. echinata* Mill., are the preferred hosts.

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<sup>1/</sup> Detection of Forest Pests in the Southeast. 1970. USDA, USFS, SA, S&PF, Div. of FPM, Pub. S&PF-7, Atlanta, Ga. 51 pp.

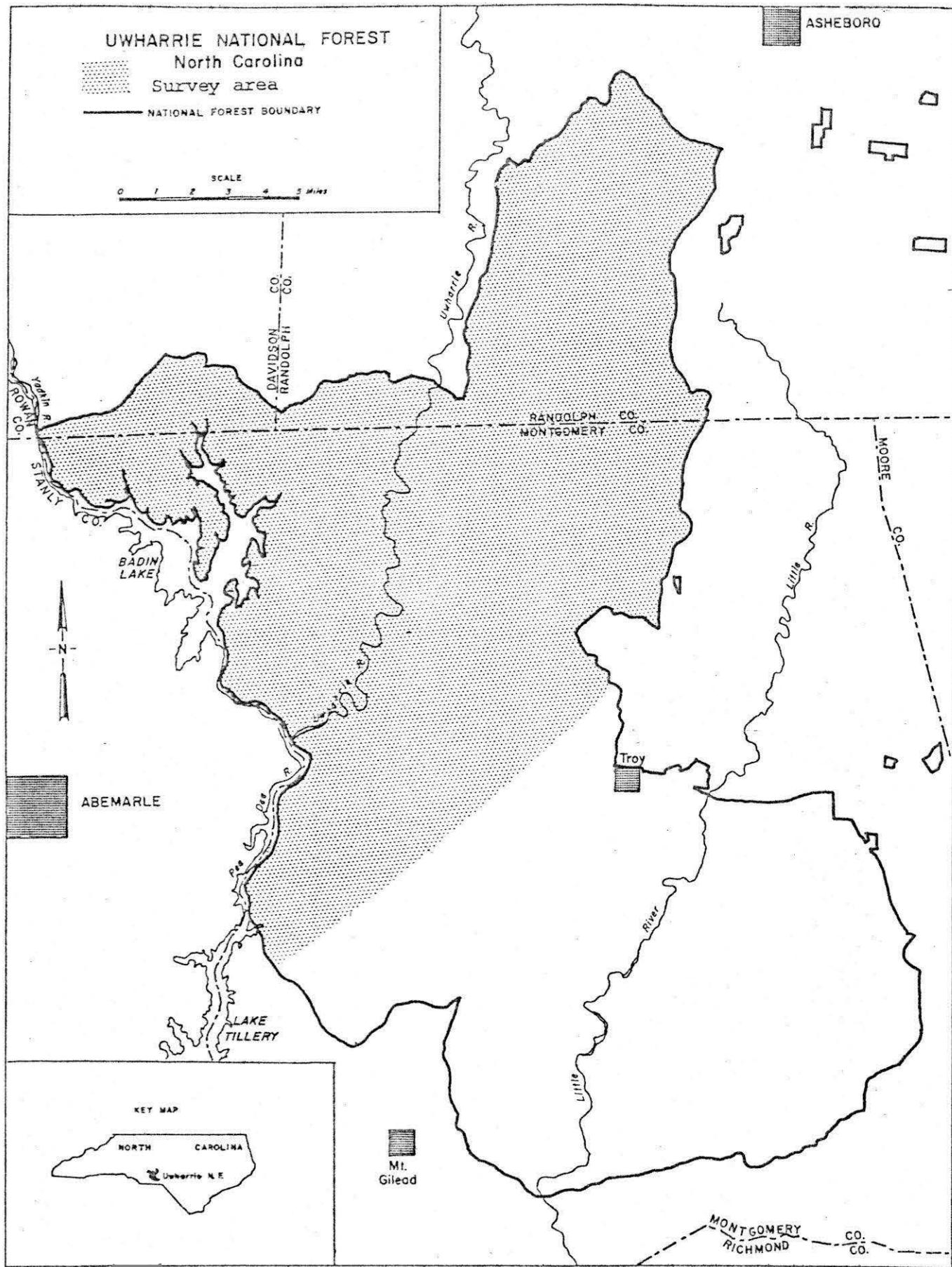


Figure 1. Aerial survey conducted July 24, 1975.

Type of Damage - Death of the tree is the result of cambial mining by the southern pine beetle as it constructs its gallery. The beetle also introduces the blue stain fungi, *Ceratocystis* spp., which slows down or blocks conduction of water in the stem.

Life cycle of the beetle - The beetles attack in pairs and construct a winding gallery in the cambium. Eggs are deposited in niches along the sides of the galleries. The eggs hatch into whitish grubs that further mine the cambium and then construct cells in the bark for pupation. The callow adults then mine through the bark to emerge. The complete life cycle takes about a month during the summer and as many as seven generations may be produced in a year.

#### RESULTS AND DISCUSSION

Results of this evaluation show a sharp decline in the level of southern pine beetle activity on the Uwharrie National Forest when compared to figures for last summer and fall (Tables 1 and 2). The biggest change in the population at the time of this survey was in the number of currently infested trees. This year only 934 actively infested trees were found as compared to 16,309 last year. This is a very good indicator that the outbreak has subsided considerably and also indicates a declining population. However, going into the winter with 934 currently infested trees also shows a potential for continued activity this fall and in the spring of 1976.

A vigorous suppression project has already removed 148,000 cu. ft. of affected pulpwood and 676,000 bd. ft. of affected sawtimber. The control effort on this district should be continued through the winter and spring of 1975-76.

#### RECOMMENDATION

It is recommended that the Uwharrie National Forest receive funding to conduct aerial surveillance over the entire Forest and suppression in those areas where resource values can justify such action. Guidelines for suppression of the southern pine beetle are outlined in the 5250 section of the Forest Service Manual as follows.

1. Removal of Infested Trees by Commercial Sale or Administrative Use. When infested trees of merchantable size are accessible, they should be removed by commercial sale or administrative use procedures. Logging of the infested material should begin immediately. Contract time limits should insure rapid removal.

Where practical, and if host type is present, a 40- to 70-foot buffer strip should be marked and cut adjacent to and ahead of

the most recently infested trees. This practice is effective in reducing the possibility of "breakouts." When only a small volume of infested merchantable material occurs in a spot, non-infested trees surrounding the spot may be marked to provide an operable cut.

The order of priority for removing beetle infested timber from a spot should be as follows:

Trees having nearly developed broods (usually the red and fading trees).

Trees having young broods (usually the green, recently infested trees).

Trees in the buffer zone.

2. Piling and Burning. Unmerchantable or inaccessible southern pine beetle infestations can be suppressed by cutting, piling, and thoroughly burning the bark of infested trees. The entire bark surface must be thoroughly burned to insure effective control. The order of priority for cutting, piling, and burning infested trees, particularly the large spots, is the same as paragraph (1) under removal of infested trees by commercial sale or administrative use. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts" every effort should be made to locate and treat all green infested trees during the piling and burning operation.
3. Chemical Control. Chemical formulation recommended for southern pine beetle control is a 1/2 percent Lindane spray with No. 2 fuel oil as the carrier. This may be formulated from a 20 percent lindane emulsifiable concentrate or oil concentrate at the rate of 11 pints of concentrate in enough fuel oil to make 55 gallons of spray. (Ratio of one part 20 percent lindane EC to 39 parts No. 2 diesel fuel.)

Cut, limb, and buck all infested trees into workable lengths. Spray the infested bark surface to the point of run-off. A compressed air sprayer (3-gallon capacity or equivalent) is an ideal applicator. Infested logs must be turned two or three times to insure complete treatment of infested bark. Spray stumps and bark removed by woodpeckers. Low pressure sprayers may be used to treat large, accessible infestations.

The order of priority for cutting and spraying infested trees in large spots is the same as paragraph (1) under removal of infested trees by commercial sale or administrative use. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts" every effort should be made to locate and treat all green infested trees during the chemical control operation.

Never spray trees from which southern pine beetle brood has emerged. Natural enemies of the southern pine beetle in these trees can then complete their development. To prevent aerial spotters from mapping treated spots, cut trees with red needles from which beetles have emerged.

Instructions for minimizing the adverse effects of mixing, transporting and storing pesticides, applying pesticides and disposing of pesticide containers and excess chemicals are outlined in section 8.3 of the Forest Service Health and Safety Code and FSM 5242.21. Detailed safety procedures should be outlined in the project suppression plan.

4. Reexamination of Treated Areas. Reexamine areas where infested trees were removed by commercial sales, piled and burned, or chemically treated within two or three weeks after treatment to check for additional infested trees. If additional trees are found, treat them.

## PRECAUTIONARY PESTICIDE USE STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key -- out of the reach of children and animals -- away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Department of Agriculture, consult your county agricultural agent or State Extension specialist to be sure the intended use is still registered.

Table 1. Summary of results of southern pine beetle evaluation conducted on the Uwharrie National Forest, July 1975.

|  | Ownership Unit           |                  |
|--|--------------------------|------------------|
|  | Uwharrie Ranger District |                  |
|  | F. Y. 1975               | F. Y. 1976       |
| 1. Results compiled from data collected during the aerial phase of the evaluation:             |                          |                  |
| Survey type . . . . .  | Aerial sketchmap         | Aerial sketchmap |
| Date of aerial survey . . . . .  | 8/29/74                  | 7/24/75          |
| Total acreage surveyed. . . . .  | 220,069                  | 220,069          |
| Total susceptible host type . . . . .  | 46,136                   | 46,136           |
| Total number of spots within the survey boundary. . . . .                                      | 184                      | 61               |
| Spots per M acre of host type (trees) . . . . .  | 4                        | 1.32             |
| Average spot size (trees) . . . . .  | 70                       | 29.5             |
| Range of spot sizes (trees) . . . . .  | 2-1500                   | 1-350            |
| 2. Results compiled from data collected during the ground and aerial phases of the evaluation: |                          |                  |
| Date of ground phase. . . . .  | 10/3/74                  | 7/30/75          |
| Infested trees per M acre of host type. . . . .  | 354                      | 20               |
| Total number of infested trees within the survey boundary . . . . .                            | 16,309                   | 934              |
| Ratio of green infested to total red and fading trees . . . . .                                | 1-1                      | 1-4              |
| Total volume of infested trees . . . . .   |                          | 7,275 cu. ft.    |
| Total volume of affected timber at the time of this survey                                     | 382,176 cu. ft.          | 17,400 cu. ft.   |
| Total volume salvaged, F.Y. 1975   | 10,400 cu. ft.           | \$48,000 cu. ft. |
|  |                          | 676,000 cu. ft.  |

Table 2. Summary of Aerial Survey Data - Uwharrie National Forest, North Carolina, July 24, 1975

| Ownership              | Infestation Size (# Trees) |       |       |       |       |       |       |       |                         |       | Total |
|------------------------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------------------------|-------|-------|
|                        | 2-5                        |       | 6-20  |       | 21-50 |       | 50+   |       | Singles : Spots : Trees |       |       |
|                        | Singles                    | Spots | Trees | Spots | Trees | Spots | Trees | Spots | Trees                   | Spots | Trees |
| Uwharrie <sup>1/</sup> | 4                          | 5     | 15    | 2     | 22    | 2     | 80    | 3     | 250                     | 16    | 371,  |
| Private <sup>1/</sup>  | 5                          | 8     | 24    | 15    | 163   | 11    | 310   | 6     | 925                     | 45    | 1427  |
| Total <sup>1/</sup>    | 9                          | 13    | 39    | 17    | 185   | 13    | 390   | 9     | 1175                    | 61    | 1798  |

Summary of Aerial Survey Data - Uwharrie National Forest, North Carolina, September 1974

| Ownership              | Infestation Size (# Trees) |       |       |       |       |       |       |       |                         |       | Total |
|------------------------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------------------------|-------|-------|
|                        | 2-5                        |       | 6-20  |       | 21-50 |       | 50+   |       | Singles : Spots : Trees |       |       |
|                        | Singles                    | Spots | Trees | Spots | Trees | Spots | Trees | Spots | Trees                   | Spots | Trees |
| Uwharrie <sup>1/</sup> | 35                         | 34    | 130   | 47    | 698   | 31    | 1264  | 37    | 10715                   | 184   | 12842 |

1/ Corrected according to data by Aldrich et. al. (1958); expanded to a 100 percent survey area coverage.